

CRUISE REPORT

Southeast Fishery-Independent Survey (SEFIS)

NOAA Ship *Pisces* Cruise PC-12-04

24 Jul – 6 Aug, 2012

9 – 23 Aug, 2012

Total Number of Days At-Sea - 29

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
Beaufort Laboratory
101 Pivers Island Rd.
Beaufort, NC 28516

328 camera-trap deployments

1 hook-and-line collection

57 CTD casts

89 XBT casts

29 areas mapped

INTRODUCTION

The NOAA Ship *Pisces* departed Morehead City, NC, on 24 July 2012 at 1600 for a Southeast Fishery-Independent Survey (SEFIS) research cruise in continental shelf and shelf-break waters off the southeastern US. SEFIS was created by the National Marine Fisheries Service in 2010 and operates out of the Beaufort Laboratory. This survey was created to conduct applied fishery-independent sampling and related research focusing on the assessment of spatial variability in distribution and abundance of red snapper and other reef species within the snapper-grouper complex, via data collected from fish traps, video cameras, and acoustics. During this survey, chevron trap catches and associated underwater video recordings were collected from hardbottom habitats found between 34.33°N and 35.03 °N. A total of 328 stations were sampled with camera-trap arrays over 29 sea days between 21 and 90 m depths.

OBJECTIVES

1. Increase the spatial footprint and sample size of fishery-independent sampling in Raleigh Bay, North Carolina (between Cape Hatteras and Cape Lookout, NC). Baited chevron traps, with 2 mounted high-definition video cameras, were utilized for (a) hardbottom reef fish community assessments, (b) collection of reef fish for biological samples (e.g., otoliths and gonads), and (c) comparative gear sampling (cameras versus traps).
2. Use video cameras on chevron traps to address trap selectivity issues, locate and describe hardbottom habitats, and provide an additional index of abundance for stock assessments.
3. Map bottom habitats using multibeam sonar to improve survey design and to expand knowledge of hardbottom habitats in the southeast US.
4. Develop new, and refine existing mapping protocols using the ME70 sonar equipment through collaborative efforts with colleagues from NOAA's Office of Coast Survey and the University of New Hampshire.
5. Use a CTD instrument package to collect environmental data (temperature, salinity, dissolved oxygen, turbidity) at camera-trap sampling locations, and XBTs to sample water temperature during multibeam mapping operations.

METHODS

Camera-Trap Sampling

Camera-trap gear consisted of two high definition video cameras mounted to a chevron fish trap. Chevron traps were composed of plastic-coated wire mesh. A Canon® camera (model HF S200) was attached above the mouth of the trap, and a GoPro® camera (model HD Hero with a flat-lens housing) was attached above the nose of the trap (Figure 1). Traps were baited with Atlantic menhaden, *Brevoortia tyrannus*, and video cameras were set to record before deployment. Camera-traps were deployed at randomly selected stations at least 200 meters apart on suspected or known hardbottom habitats, and left to soak for approximately 90 minutes. Camera-traps were most often deployed in sets of six. A CTD cast (see environmental data collection) was conducted during the 90-minute soak time for each trap set. Fish catches were processed after trap retrieval. All fish were counted, weighed, and measured to the nearest millimeter. Individuals of select species (e.g., species in the snapper-

grouper complex) were further processed for additional lengths and biological samples (otoliths, gonads, and DNA). Video files were downloaded and backed up on media storage devices. Biological samples were sent to the Marine Resources Monitoring, Assessment, and Prediction (MARMAP) Program laboratory for processing, and video files were brought to the NMFS Beaufort laboratory for further processing and analysis.

Environmental Data Collection

Environmental data were collected with Seabird “Conductivity, Temperature, and Depth” instrument package (CTD; model SBE 9) and Scientific Computer System software (SCS; version 4). CTD casts were conducted near the middle of the camera-trap soak period; instruments were lowered to within 2 meters of the bottom. Numerous water profile measurements were taken, including temperature ($^{\circ}\text{C}$), salinity (psu), dissolved oxygen (mg/L), average sound velocity (m/s), fluorescence (mg/m 3), and turbidity (% transmission). CTD data were archived for further processing at the Beaufort laboratory. SCS software was used to collect specific information for each fishing and CTD event, including soak time/cast duration as well as start and end latitude, longitude and depth (m). Expendable bathythermographs (XBTs) were deployed during the mapping shift to collect water column temperature data while the ship was underway.

Acoustic Data Collection

The Pisces ME70 multibeam sonar was used to create hydrographic maps for operational planning (e.g., select potential camera-trap site coordinates on unsampled hardbottom habitat) and future research uses. The first three days of the first leg were dedicated to optimizing the ME70 for use on the rest of the cruise. Areas for mapping were selected based on (1) hardbottom points provided to SEFIS by commercial and recreational fishermen, public sources, and other scientists, (2) hardbottom habitat predicted based on a model developed by Duke University, and (3) efficient use of vessel time. Original ME70 data files (*.raw) were processed through proprietary MATLAB software products; these products derived hydrographic data (*.xyz or *.gsf format, respectively) from files collected in the ME70 “fisheries research mode.” Bathymetry and backscatter were further processed via Caris HIPS and SIPS v7.1.2 and QPS Fledermaus v7.3.2. Potential camera-trap site coordinates were exported to ArcGIS (v9) and navigation software for planning and archiving.

SURVEY RESULTS

Camera-Trap Sampling

328 stations were sampled with camera-trap gear (Table 1, Figure 2). No traps were lost, but one Canon camera broke free of a trap and was not immediately found; approximately two weeks later, a beachcomber found the camera on Shackleford Banks and returned it to SEFIS in working order.

Environmental Data Collection

57 CTD casts (Table 1, Figure 2) and 89 XBT casts were conducted during the cruise. CTD data will be processed back at the lab with Seabird SBE Data Processing software (version 7.2), and archived in a database at the NMFS-Beaufort Laboratory for future analysis.

Multibeam Acoustics Data Collection

Twenty-nine areas were mapped, totaling approximately 385 km 2 (Figure 3). Maps were compiled in an ArcGIS project. Multibeam maps were used to select trap-camera sampling sites, i.e., identifying hardbottom habitats. Multibeam data were archived on a server at the NMFS-Beaufort Laboratory for future analysis.

Table 1. Summary of station coordinates, depth (m), date and time for each collection (camera-trap, Gear=324; hook and line, Gear=014) and CTD cast (Gear=298) conducted on the PC-12-04 survey. Times were recorded in Coordinated Universal Time (UTC).

Collection	Gear ID	Date	Start Time	Start Latitude	Start Longitude	Start Depth
128001	324	7/26/2012	16:39	34.36	-76.38	24
128002	324	7/26/2012	16:44	34.35	-76.38	24
128003	324	7/26/2012	16:51	34.35	-76.38	24
128004	324	7/26/2012	16:58	34.34	-76.38	24
128005	324	7/26/2012	17:02	34.34	-76.38	24
128006	324	7/26/2012	17:07	34.33	-76.38	27
128007	298	7/26/2012	17:28	34.36	-76.37	25
128008	324	7/27/2012	12:04	34.57	-76.21	37
128009	324	7/27/2012	12:11	34.57	-76.20	37
128010	324	7/27/2012	12:19	34.56	-76.20	38
128011	324	7/27/2012	12:27	34.56	-76.21	37
128012	324	7/27/2012	12:34	34.56	-76.21	36
128013	324	7/27/2012	12:39	34.56	-76.22	36
128014	298	7/27/2012	12:51	34.57	-76.21	37
128015	324	7/27/2012	15:29	34.55	-76.22	38
128016	324	7/27/2012	15:34	34.55	-76.21	39
128017	324	7/27/2012	15:39	34.55	-76.20	40
128018	324	7/27/2012	15:45	34.54	-76.21	39
128019	324	7/27/2012	15:49	34.54	-76.21	39
128020	324	7/27/2012	15:53	34.54	-76.21	38
128021	298	7/27/2012	16:04	34.55	-76.21	39
128022	324	7/27/2012	18:18	34.54	-76.21	40
128023	324	7/27/2012	18:22	34.53	-76.21	41
128024	324	7/27/2012	18:27	34.53	-76.22	40
128025	324	7/27/2012	18:33	34.53	-76.21	39
128026	324	7/27/2012	18:38	34.52	-76.21	40
128027	324	7/27/2012	18:46	34.52	-76.20	40
128028	298	7/27/2012	18:50	34.52	-76.20	40
128029	324	7/28/2012	12:01	34.57	-76.33	25
128030	324	7/28/2012	12:04	34.57	-76.33	27
128031	324	7/28/2012	12:08	34.57	-76.33	28
128032	324	7/28/2012	12:13	34.57	-76.34	28
128033	324	7/28/2012	12:21	34.56	-76.34	26
128034	324	7/28/2012	12:24	34.56	-76.34	24
128035	298	7/28/2012	12:36	34.57	-76.33	26
128036	324	7/28/2012	14:20	34.56	-76.34	26
128037	324	7/28/2012	14:24	34.56	-76.34	24

128038	324	7/28/2012	14:30	34.55	-76.33	27
128039	324	7/28/2012	14:38	34.55	-76.34	27
128040	324	7/28/2012	14:45	34.55	-76.34	24
128041	324	7/28/2012	14:52	34.55	-76.34	27
128042	298	7/28/2012	15:02	34.56	-76.34	27
128043	324	7/28/2012	16:58	34.55	-76.34	24
128044	324	7/28/2012	17:03	34.54	-76.34	28
128045	324	7/28/2012	17:12	34.53	-76.35	24
128046	324	7/28/2012	17:17	34.53	-76.35	23
128047	324	7/28/2012	17:26	34.53	-76.35	23
128048	324	7/28/2012	17:29	34.53	-76.35	24
128049	298	7/28/2012	17:35	34.53	-76.35	25
128050	324	7/29/2012	12:01	34.58	-75.81	63
128051	324	7/29/2012	12:07	34.58	-75.81	63
128052	324	7/29/2012	12:11	34.58	-75.81	62
128053	324	7/29/2012	12:18	34.58	-75.82	61
128054	324	7/29/2012	12:27	34.57	-75.81	62
128055	324	7/29/2012	12:36	34.57	-75.82	62
128056	298	7/29/2012	12:48	34.56	-75.82	64
128057	324	7/29/2012	16:14	34.61	-76.14	39
128058	324	7/29/2012	16:19	34.61	-76.14	39
128059	324	7/29/2012	16:22	34.61	-76.15	39
128060	324	7/29/2012	16:25	34.60	-76.15	39
128061	324	7/29/2012	16:31	34.60	-76.14	40
128062	324	7/29/2012	16:33	34.60	-76.14	39
128063	298	7/29/2012	16:37	34.60	-76.13	39
128064	324	7/30/2012	12:03	34.57	-75.87	59
128065	324	7/30/2012	12:10	34.56	-75.87	58
128066	324	7/30/2012	12:14	34.56	-75.88	58
128067	298	7/30/2012	12:26	34.57	-75.88	57
128068	324	7/30/2012	14:33	34.58	-75.82	61
128069	324	7/30/2012	14:37	34.58	-75.83	62
128070	324	7/30/2012	14:41	34.57	-75.83	62
128071	324	7/30/2012	14:44	34.57	-75.83	63
128072	324	7/30/2012	14:48	34.57	-75.84	60
128073	324	7/30/2012	14:52	34.57	-75.84	62
128074	298	7/30/2012	15:04	34.58	-75.84	58
128075	324	7/30/2012	17:23	34.58	-75.82	62
128076	324	7/30/2012	17:30	34.58	-75.82	63
128077	324	7/30/2012	17:34	34.58	-75.82	64
128078	298	7/30/2012	17:40	34.58	-75.82	62
128079	324	8/1/2012	11:58	34.69	-75.88	39
128080	324	8/1/2012	12:02	34.69	-75.88	42

128081	324	8/1/2012	12:06	34.69	-75.87	42
128082	324	8/1/2012	12:11	34.69	-75.87	42
128083	324	8/1/2012	12:17	34.69	-75.87	41
128084	324	8/1/2012	12:20	34.69	-75.88	42
128085	298	8/1/2012	12:34	34.69	-75.87	41
128086	324	8/1/2012	14:38	34.71	-75.87	40
128087	324	8/1/2012	14:42	34.71	-75.86	41
128088	324	8/1/2012	14:46	34.71	-75.86	41
128089	324	8/1/2012	14:48	34.71	-75.86	41
128090	324	8/1/2012	14:55	34.71	-75.85	41
128091	324	8/1/2012	15:02	34.70	-75.86	42
128092	298	8/1/2012	15:07	34.70	-75.86	41
128093	324	8/1/2012	17:30	34.73	-75.77	41
128094	324	8/1/2012	17:40	34.73	-75.76	40
128095	324	8/1/2012	17:52	34.73	-75.76	40
128096	298	8/1/2012	18:00	34.73	-75.76	41
128097	324	8/2/2012	11:59	34.82	-75.79	33
128098	324	8/2/2012	12:02	34.82	-75.79	34
128099	324	8/2/2012	12:15	34.82	-75.80	35
128100	324	8/2/2012	12:19	34.82	-75.80	35
128101	324	8/2/2012	12:24	34.81	-75.79	34
128102	324	8/2/2012	12:26	34.81	-75.79	33
128103	298	8/2/2012	12:31	34.81	-75.79	32
128104	324	8/2/2012	16:35	34.86	-75.54	63
128105	324	8/2/2012	16:44	34.86	-75.53	58
128106	324	8/2/2012	16:48	34.86	-75.53	62
128107	324	8/2/2012	16:50	34.86	-75.53	58
128108	324	8/2/2012	16:53	34.86	-75.53	56
128109	324	8/2/2012	16:59	34.85	-75.53	59
128110	298	8/2/2012	17:12	34.85	-75.52	69
128111	324	8/3/2012	12:01	35.03	-75.64	31
128112	324	8/3/2012	12:06	35.03	-75.64	30
128113	324	8/3/2012	12:13	35.03	-75.64	31
128114	324	8/3/2012	12:23	35.03	-75.62	32
128115	324	8/3/2012	12:29	35.04	-75.62	32
128116	324	8/3/2012	12:36	35.04	-75.61	32
128117	298	8/3/2012	12:42	35.03	-75.61	32
128118	324	8/3/2012	16:22	34.92	-75.51	55
128119	324	8/3/2012	16:27	34.92	-75.51	55
128120	324	8/3/2012	16:33	34.91	-75.51	58
128121	324	8/3/2012	16:39	34.91	-75.52	58
128122	324	8/3/2012	16:43	34.90	-75.52	59
128123	324	8/3/2012	16:48	34.90	-75.52	58

128124	298	8/3/2012	16:56	34.90	-75.52	57
128125	324	8/3/2012	19:03	34.91	-75.51	55
128126	324	8/3/2012	19:14	34.91	-75.51	57
128127	324	8/3/2012	19:21	34.91	-75.52	56
128128	324	8/3/2012	19:30	34.90	-75.52	57
128129	298	8/3/2012	19:35	34.90	-75.52	60
128130	324	8/4/2012	12:00	35.02	-75.46	49
128131	324	8/4/2012	12:03	35.01	-75.47	49
128132	324	8/4/2012	12:08	35.01	-75.46	50
128133	324	8/4/2012	12:12	35.01	-75.46	51
128134	324	8/4/2012	12:17	35.01	-75.46	50
128135	324	8/4/2012	12:23	35.00	-75.46	50
128136	298	8/4/2012	12:29	35.00	-75.46	52
128137	324	8/4/2012	14:30	35.00	-75.47	51
128138	324	8/4/2012	14:35	34.99	-75.46	52
128139	324	8/4/2012	14:42	34.99	-75.46	53
128140	324	8/4/2012	14:44	34.98	-75.46	52
128141	324	8/4/2012	14:47	34.98	-75.46	53
128142	324	8/4/2012	14:51	34.98	-75.46	54
128143	298	8/4/2012	14:58	34.97	-75.46	59
128144	324	8/4/2012	17:29	34.99	-75.46	52
128145	324	8/4/2012	17:35	35.00	-75.46	50
128146	324	8/4/2012	17:39	35.00	-75.46	50
128147	324	8/4/2012	17:47	35.00	-75.46	50
128148	324	8/4/2012	17:55	35.00	-75.46	51
128149	324	8/4/2012	17:59	35.01	-75.45	50
128150	298	8/4/2012	18:14	34.99	-75.46	52
128151	324	8/5/2012	12:07	34.87	-75.52	60
128152	324	8/5/2012	12:11	34.87	-75.52	61
128153	324	8/5/2012	12:16	34.87	-75.53	58
128154	324	8/5/2012	12:20	34.86	-75.53	57
128155	324	8/5/2012	12:23	34.86	-75.53	58
128156	324	8/5/2012	12:28	34.86	-75.53	59
128157	298	8/5/2012	12:41	34.87	-75.53	69
128158	324	8/5/2012	14:57	34.86	-75.53	55
128159	324	8/5/2012	15:02	34.86	-75.52	60
128160	324	8/5/2012	15:07	34.87	-75.51	56
128161	324	8/5/2012	15:09	34.87	-75.51	56
128162	324	8/5/2012	15:13	34.87	-75.51	58
128163	324	8/5/2012	15:17	34.87	-75.51	58
128164	298	8/5/2012	15:28	34.88	-75.50	75
128165	324	8/9/2012	17:21	34.52	-76.35	25
128166	324	8/9/2012	17:25	34.52	-76.35	24

128167	324	8/9/2012	17:32	34.52	-76.35	23
128168	324	8/9/2012	17:35	34.52	-76.35	25
128169	324	8/9/2012	17:42	34.52	-76.35	24
128170	324	8/9/2012	17:45	34.52	-76.36	24
128171	298	8/9/2012	17:56	34.52	-76.35	25
128172	324	8/10/2012	12:06	34.59	-76.32	27
128173	324	8/10/2012	12:11	34.59	-76.31	27
128174	324	8/10/2012	12:15	34.59	-76.31	28
128175	324	8/10/2012	12:22	34.59	-76.32	28
128176	324	8/10/2012	12:26	34.58	-76.32	27
128177	324	8/10/2012	12:28	34.58	-76.31	27
128178	298	8/10/2012	12:33	34.58	-76.31	29
128179	324	8/10/2012	14:38	34.60	-76.33	26
128180	324	8/10/2012	14:42	34.60	-76.32	26
128181	324	8/10/2012	14:45	34.59	-76.32	26
128182	324	8/10/2012	14:48	34.59	-76.32	27
128183	324	8/10/2012	14:55	34.59	-76.31	27
128184	324	8/10/2012	14:58	34.59	-76.31	27
128185	298	8/10/2012	15:02	34.59	-76.31	28
128186	324	8/11/2012	13:27	34.62	-76.17	37
128187	324	8/11/2012	13:30	34.61	-76.16	38
128188	324	8/11/2012	13:32	34.61	-76.17	38
128189	324	8/11/2012	13:37	34.61	-76.16	38
128190	324	8/11/2012	13:39	34.62	-76.16	38
128191	324	8/11/2012	13:41	34.62	-76.16	38
128192	298	8/11/2012	13:45	34.62	-76.16	39
128193	324	8/11/2012	16:30	34.62	-76.15	38
128194	324	8/11/2012	16:33	34.62	-76.15	38
128195	324	8/11/2012	16:37	34.63	-76.15	38
128196	324	8/11/2012	16:40	34.63	-76.15	38
128197	324	8/11/2012	16:43	34.63	-76.16	39
128198	324	8/11/2012	16:46	34.63	-76.16	38
128199	298	8/11/2012	16:50	34.63	-76.16	37
128200	324	8/11/2012	19:13	34.61	-76.19	38
128201	324	8/11/2012	19:17	34.61	-76.19	38
128202	324	8/11/2012	19:20	34.60	-76.20	38
128203	324	8/11/2012	19:28	34.61	-76.20	37
128204	324	8/11/2012	19:31	34.60	-76.20	38
128205	324	8/11/2012	19:34	34.60	-76.20	39
128206	298	8/11/2012	19:40	34.60	-76.20	37
128207	324	8/12/2012	12:03	34.60	-76.20	37
128208	324	8/12/2012	12:05	34.60	-76.20	37
128209	324	8/12/2012	12:09	34.60	-76.20	37

128210	324	8/12/2012	12:12	34.59	-76.20	37
128211	324	8/12/2012	12:16	34.59	-76.20	37
128212	324	8/12/2012	12:21	34.59	-76.20	37
128213	298	8/12/2012	12:26	34.59	-76.19	37
128214	324	8/12/2012	14:22	34.61	-76.17	38
128215	324	8/12/2012	14:26	34.61	-76.17	38
128216	324	8/12/2012	14:28	34.60	-76.17	39
128217	324	8/12/2012	14:31	34.60	-76.17	39
128218	324	8/12/2012	14:36	34.60	-76.18	38
128219	324	8/12/2012	14:40	34.60	-76.18	38
128220	298	8/12/2012	14:44	34.60	-76.18	38
128221	324	8/12/2012	16:57	34.62	-76.13	40
128222	324	8/12/2012	16:59	34.62	-76.14	39
128223	324	8/12/2012	17:04	34.62	-76.14	39
128224	324	8/12/2012	17:08	34.62	-76.14	39
128225	324	8/12/2012	17:13	34.62	-76.15	39
128226	324	8/12/2012	17:18	34.62	-76.15	39
128227	298	8/12/2012	17:28	34.62	-76.15	39
128228	324	8/13/2012	12:02	34.82	-76.03	33
128229	324	8/13/2012	12:05	34.82	-76.03	33
128230	324	8/13/2012	12:10	34.81	-76.03	33
128231	324	8/13/2012	12:15	34.81	-76.04	33
128232	324	8/13/2012	12:21	34.81	-76.04	32
128233	324	8/13/2012	12:26	34.81	-76.04	32
128234	298	8/13/2012	12:31	34.80	-76.05	33
128235	324	8/13/2012	14:40	34.83	-76.12	25
128236	324	8/13/2012	14:48	34.83	-76.12	25
128237	324	8/13/2012	14:54	34.83	-76.13	24
128238	298	8/13/2012	14:58	34.83	-76.13	24
128239	324	8/13/2012	18:12	34.52	-76.35	24
128240	324	8/13/2012	18:15	34.52	-76.35	23
128241	324	8/13/2012	18:18	34.51	-76.35	24
128242	324	8/13/2012	18:21	34.51	-76.35	23
128243	324	8/13/2012	18:24	34.51	-76.36	24
128244	324	8/13/2012	18:29	34.51	-76.36	21
128245	298	8/13/2012	18:34	34.51	-76.36	22
128246	324	8/14/2012	11:59	34.61	-75.79	62
128247	324	8/14/2012	12:02	34.61	-75.80	60
128248	324	8/14/2012	12:04	34.61	-75.80	60
128249	324	8/14/2012	12:07	34.61	-75.80	61
128250	324	8/14/2012	12:15	34.61	-75.80	60
128251	324	8/14/2012	12:19	34.62	-75.79	60
128252	298	8/14/2012	12:26	34.62	-75.79	61

128253	324	8/14/2012	14:51	34.66	-75.74	59
128254	324	8/14/2012	14:56	34.66	-75.75	59
128255	324	8/14/2012	14:58	34.66	-75.75	59
128256	324	8/14/2012	15:01	34.65	-75.75	58
128257	324	8/14/2012	15:07	34.65	-75.75	59
128258	324	8/14/2012	15:10	34.65	-75.75	59
128259	298	8/14/2012	15:15	34.65	-75.75	60
128260	324	8/14/2012	17:18	34.67	-75.74	58
128261	324	8/14/2012	17:21	34.67	-75.74	58
128262	324	8/14/2012	17:25	34.67	-75.74	58
128263	324	8/14/2012	17:28	34.67	-75.74	58
128264	324	8/14/2012	17:42	34.67	-75.74	58
128265	324	8/14/2012	17:44	34.67	-75.74	58
128266	298	8/14/2012	17:48	34.67	-75.74	58
128267	324	8/16/2012	11:29	34.94	-75.45	64
128268	324	8/16/2012	11:33	34.93	-75.45	65
128269	324	8/16/2012	11:36	34.93	-75.46	62
128270	324	8/16/2012	11:40	34.93	-75.46	66
128271	324	8/16/2012	11:42	34.93	-75.46	63
128272	324	8/16/2012	11:45	34.93	-75.46	62
128273	298	8/16/2012	11:55	34.93	-75.46	69
128274	324	8/16/2012	13:52	34.93	-75.46	62
128275	324	8/16/2012	13:58	34.93	-75.47	63
128276	324	8/16/2012	14:03	34.92	-75.47	63
128277	324	8/16/2012	14:11	34.92	-75.46	65
128278	324	8/16/2012	14:15	34.92	-75.47	66
128279	324	8/16/2012	14:18	34.92	-75.47	65
128280	298	8/16/2012	14:24	34.92	-75.47	70
128281	324	8/16/2012	17:41	34.94	-75.46	64
128282	324	8/16/2012	17:45	34.93	-75.46	61
128283	324	8/16/2012	17:49	34.93	-75.46	63
128284	324	8/16/2012	17:54	34.93	-75.46	61
128285	324	8/16/2012	17:58	34.92	-75.47	63
128286	324	8/16/2012	18:02	34.92	-75.47	63
128287	298	8/16/2012	18:08	34.92	-75.47	65
128288	324	8/17/2012	12:00	34.93	-75.51	56
128289	324	8/17/2012	12:04	34.92	-75.51	55
128290	324	8/17/2012	12:08	34.92	-75.52	55
128291	324	8/17/2012	12:11	34.92	-75.52	54
128292	324	8/17/2012	12:14	34.92	-75.52	55
128293	324	8/17/2012	12:17	34.92	-75.53	54
128294	298	8/17/2012	12:23	34.92	-75.53	54
128295	324	8/17/2012	14:26	34.93	-75.52	54

128296	324	8/17/2012	14:30	34.92	-75.52	54
128297	324	8/17/2012	14:33	34.92	-75.52	53
128298	324	8/17/2012	14:35	34.92	-75.53	53
128299	324	8/17/2012	14:42	34.92	-75.53	53
128300	324	8/17/2012	14:46	34.92	-75.53	52
128301	298	8/17/2012	14:51	34.92	-75.53	52
128302	324	8/17/2012	17:04	34.92	-75.51	54
128303	324	8/17/2012	17:10	34.92	-75.51	55
128304	324	8/17/2012	17:13	34.92	-75.50	56
128305	324	8/17/2012	17:15	34.92	-75.50	57
128306	324	8/17/2012	17:19	34.92	-75.50	59
128307	324	8/17/2012	17:25	34.92	-75.50	60
128308	298	8/17/2012	17:33	34.92	-75.50	60
128309	324	8/19/2012	12:01	34.48	-75.89	76
128310	324	8/19/2012	12:05	34.48	-75.88	76
128311	324	8/19/2012	12:10	34.48	-75.87	84
128312	324	8/19/2012	12:13	34.49	-75.87	89
128313	324	8/19/2012	12:16	34.49	-75.87	90
128314	324	8/19/2012	12:18	34.49	-75.86	90
128315	298	8/19/2012	12:27	34.49	-75.87	83
128316	324	8/19/2012	14:39	34.47	-75.90	74
128317	324	8/19/2012	14:42	34.47	-75.90	75
128318	324	8/19/2012	14:46	34.48	-75.90	74
128319	324	8/19/2012	14:50	34.48	-75.89	74
128320	324	8/19/2012	14:54	34.48	-75.89	74
128321	324	8/19/2012	15:01	34.49	-75.88	74
128322	298	8/19/2012	15:06	34.49	-75.88	76
128323	324	8/19/2012	17:45	34.45	-75.93	74
128324	324	8/19/2012	17:50	34.45	-75.92	73
128325	324	8/19/2012	17:55	34.46	-75.92	73
128326	324	8/19/2012	18:00	34.46	-75.92	72
128327	324	8/19/2012	18:05	34.46	-75.91	72
128328	324	8/19/2012	18:11	34.47	-75.91	73
128329	298	8/19/2012	18:17	34.47	-75.91	72
128330	324	8/20/2012	12:21	34.48	-75.87	89
128331	324	8/20/2012	12:26	34.48	-75.88	86
128332	324	8/20/2012	12:31	34.47	-75.88	89
128333	324	8/20/2012	12:35	34.47	-75.89	85
128334	324	8/20/2012	12:43	34.46	-75.90	81
128335	324	8/20/2012	12:50	34.46	-75.90	81
128336	298	8/20/2012	12:56	34.46	-75.91	84
128337	324	8/20/2012	15:01	34.47	-75.89	81
128338	324	8/20/2012	15:05	34.47	-75.89	82

128339	324	8/20/2012	15:10	34.47	-75.88	83
128340	324	8/20/2012	15:14	34.48	-75.88	80
128341	324	8/20/2012	15:19	34.48	-75.88	80
128342	324	8/20/2012	15:22	34.49	-75.88	77
128343	298	8/20/2012	17:33	34.48	-75.88	80
124810	014	8/21/2012	20:00	34.55	-76.23	38
128344	324	8/21/2012	11:59	34.57	-76.22	37
128345	324	8/21/2012	12:03	34.57	-76.23	37
128346	324	8/21/2012	12:07	34.56	-76.23	38
128347	324	8/21/2012	12:10	34.56	-76.24	37
128348	324	8/21/2012	12:18	34.56	-76.23	38
128349	324	8/21/2012	12:24	34.56	-76.22	39
128350	298	8/21/2012	12:30	34.56	-76.22	38
128351	324	8/21/2012	14:46	34.55	-76.24	38
128352	324	8/21/2012	14:51	34.55	-76.23	38
128353	324	8/21/2012	14:53	34.55	-76.23	39
128354	324	8/21/2012	14:56	34.55	-76.23	39
128355	324	8/21/2012	14:59	34.55	-76.22	39
128356	324	8/21/2012	15:03	34.55	-76.22	39
128357	298	8/21/2012	15:08	34.55	-76.22	39
128358	324	8/21/2012	17:56	34.56	-76.25	36
128359	324	8/21/2012	17:59	34.56	-76.25	36
128360	324	8/21/2012	18:03	34.56	-76.25	37
128361	324	8/21/2012	18:08	34.56	-76.24	37
128362	324	8/21/2012	18:10	34.56	-76.24	37
128363	324	8/21/2012	18:14	34.56	-76.23	37
128364	298	8/21/2012	18:19	34.56	-76.23	38
128365	324	8/22/2012	11:56	34.53	-76.26	36
128366	324	8/22/2012	11:58	34.53	-76.26	37
128367	324	8/22/2012	12:02	34.52	-76.26	36
128368	324	8/22/2012	12:06	34.52	-76.26	37
128369	324	8/22/2012	12:09	34.52	-76.26	37
128370	324	8/22/2012	12:14	34.52	-76.26	37
128371	298	8/22/2012	12:19	34.52	-76.25	37
128372	324	8/22/2012	14:21	34.54	-76.25	37
128373	324	8/22/2012	14:25	34.54	-76.25	37
128374	324	8/22/2012	14:29	34.55	-76.24	37
128375	324	8/22/2012	14:33	34.55	-76.24	37
128376	324	8/22/2012	14:36	34.55	-76.24	38
128377	324	8/22/2012	14:39	34.55	-76.23	37
128378	298	8/22/2012	14:45	34.55	-76.23	38
128379	324	8/22/2012	17:09	34.58	-76.21	37
128380	324	8/22/2012	17:14	34.58	-76.22	37

128381	324	8/22/2012	17:17	34.58	-76.22	37
128382	324	8/22/2012	17:23	34.57	-76.23	37
128383	324	8/22/2012	17:26	34.57	-76.23	37
128384	324	8/22/2012	17:29	34.57	-76.22	38
128385	298	8/22/2012	17:34	34.57	-76.22	37



Figure 1. Chevron trap with video camera gear used to sample reef fish on the PC-12-04 survey.

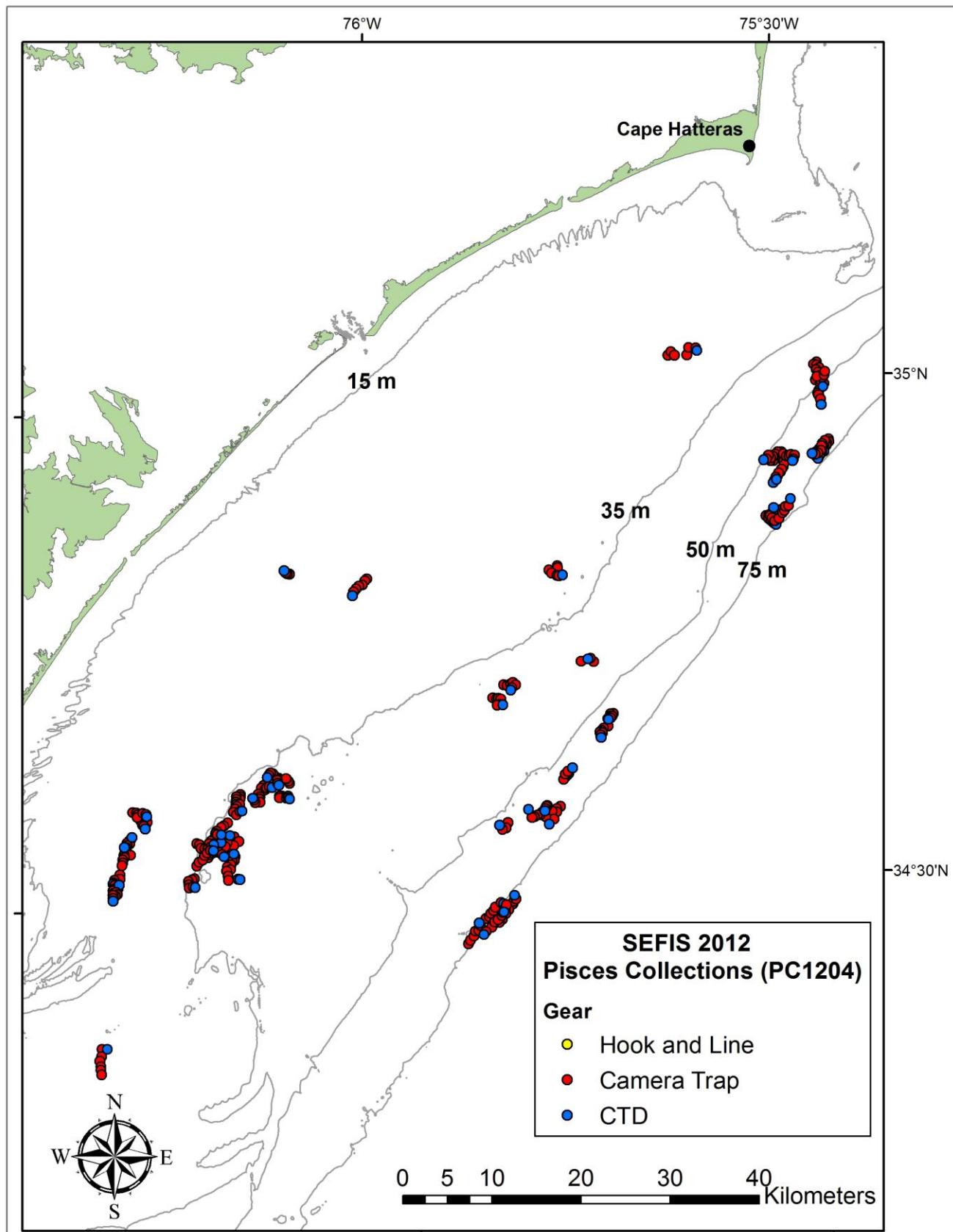


Figure 2. Locations of stations sampled with camera-trap and CTD gear on the PC-12-04 survey. Note that symbols overlap in many cases.

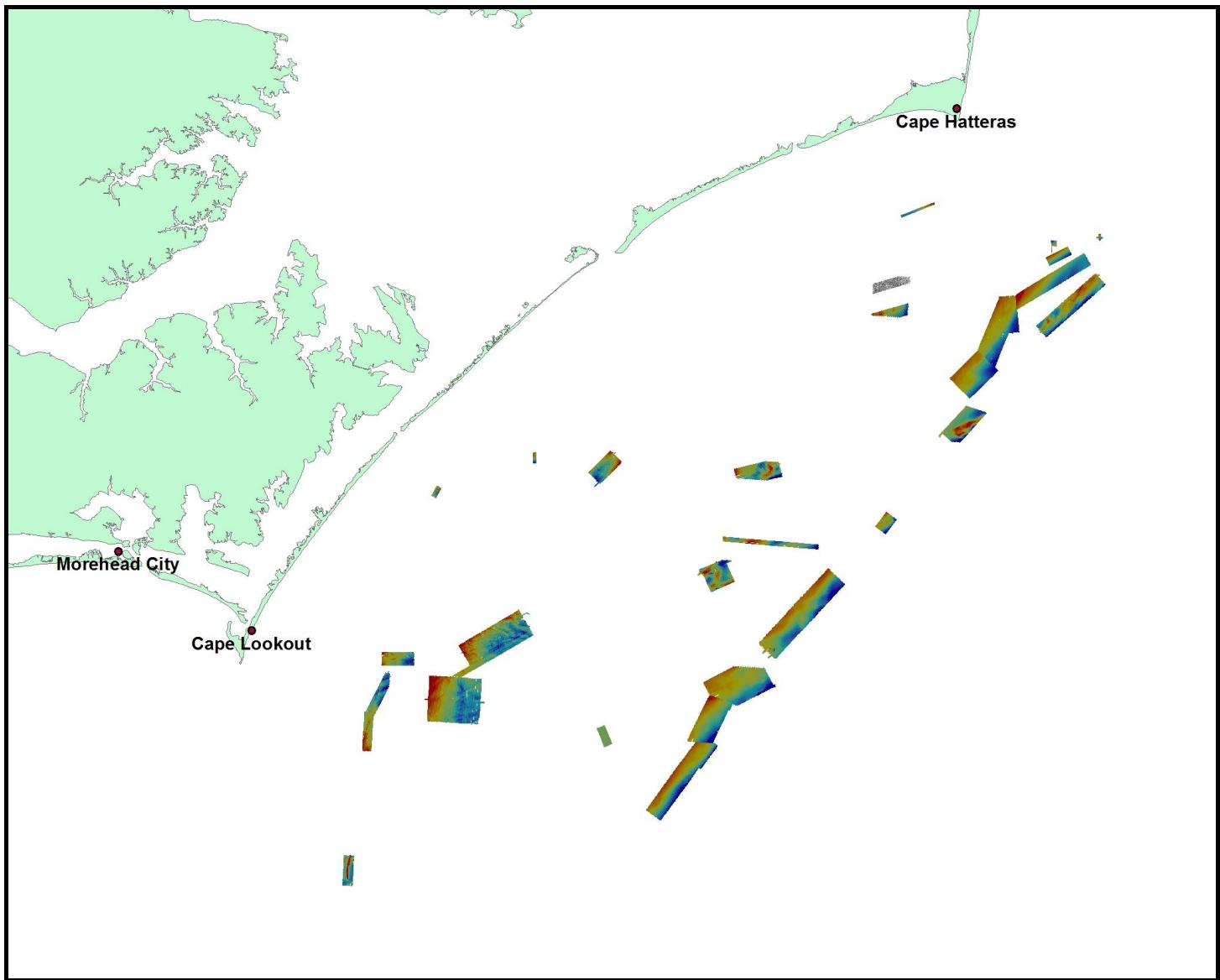


Figure 3. Locations mapped with multibeam acoustic gear on the PC-12-04 survey.

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Note: The use of trade, product, industry, or firm names, products, software, or models, whether commercially available or not, is for informative purposes only and does not constitute an endorsement by the U.S. Government or the National Oceanic and Atmospheric Administration.